Digitized by the Internet Archive
in 2018 with funding from
University of Toronto

https://archive.org/details/medjournalApr1928uoft

The University of Toronto Medical Journal

VOL. V APRIL, 1928 NO. 6

A Greek Clinic in Hippocrates' Day.

(By J. T. Fotheringham, C.M.G., B.A., M.D.)

The illustration is from a vase painting of about 400 B.C. In the centre sits a physician, holding a lancet, and bleeding a patient, who is leaning on his crutch, from the median vein at the bend of the right elbow, into a large open basin. Note the beauty of the lines of the basin and the symmetry of its base with its three molded feet. Above and behind the physician as part of his office furniture are hanging three cupping vessels. To the right sits another patient with crutch or cane awaiting his turn, his left arm bandaged below the shoulder. The figure beyond him is smelling a flower, perhaps a purely aesthetic matter, perhaps as a protection against infection, for pleasant odours are still regarded by many as a protection against evil smells. Behind the physician stands a man, leaning on a staff. Any reader of this article who served in Salonica will note the striking resemblance between these long staffs or crutches with their curved tops and the crooks or sticks of the Greek shepherds, used still probably without a single item of change in all those centuries. The draftsmanship is so perfect as to show that they are plainly made from the same kind of tree as is still used for the purpose in those regions. This patient has been wounded in the left leg, which is bandaged. By his side stands a dwarfish figure with disproportionately large misshapen head, a hairy body, and a nose with sunken bridge. The malformation of his limbs and body plainly exhibit the deformities of achondroplasia. On his back he carries a hare, almost as large as himself, perhaps by way of fees or gift to the physcian, or possibly an artistic device to direct attenton to the squatness of his figure. Talking to the dwarf is a man leaning on a long staff, who has the remains of a bandage around his chest.

Ths illustration has been reproduced that the reader might see the delicacy and modernness of the work of Hippocratic school twenty-five centuries ago, and more. It illustrates the spirit and temper of the whole Hippocratic Corpus. The case of achondroplasia, the art of bleeding and of bandaging, even the postures and facial expressions of the patients, seem start-

lingly modern, but only because they are fundamental and belong to the nature of man and to all sound practice of the healing art. In the text of certain treatises in the Corpus, say in the notebook *Concerning the Surgery,* or the more elaborate treatise *On the Physician,* we may read minute directions for the preparation of the operating room, and on such points as the management of light both artificial and natural, scrupulous cleanliness of the hands and nails, their proper length, the care and use of instruments, with the special precautions needed when they are of iron (bronze was the favorite metal, for while the ancients could not make steel, they found the art, since lost, of making bronze tough and fit to hold an edge). Other parts of those wonderful old treatises detailed the decencies to be observed during the operation, the avoidance of unnecessary exposure of the patient, the general methods of bandaging, the placing of the patient, the use and abuse of splints, and the need for tidiness, order, and cleanliness. As Withington has truly said, "Everything worthy of the name of Medicine from Hippocrates (460-357 B.C.) to Harvey (1578-1657), is Greek Medicine, whether we find it at Alexandria, Rome, Bagdad, Salerno, or Paris."

What of the man whose name, so far as Medicine goes, this wonderful period bears! Perhaps before mentioning the man it would be profitable to provide a list of his contemporaries and the fields in which they were famous. The Period lay wholly or in part within the Fifth Century B.C., and the country, to our western eyes a little larger than a postage stamp, was Greece. The Period is known as the Periclean Age from the name of the most outstanding of its statesmen. In Philosophy there were Socrates, Plato and Aristotle. Its dramatists were: In Tragedy: Aeschylus, Sophocles and Euripides, and in Comedy, Aristophanes. In History was Thucydides, in Sculpture were Phidias, Praxiteles, and Polycleitus, in Painting, Zeuxis, Polygnotus, and Parrhasius. The phenomenon of the simultaneous appearance of so great a galaxy in so brief a period and so little an area of this world will probably never be accounted for.

The task of compressing into an article such as this what should be said about Hippocrates is one to dismay any essayist, but the attempt may be made under three heads. (1) The Man, (2) The Method, (3) The Spirit.

As to the Man, of the actual details of his life we know next to nothing. Born of a long line of physicians in the Island of Cos, off the south-western corner of Asia Minor, and associated with its famous Asclepieum or temple of Asclepios, he led a wandering life. He moved about the islands and towns of the Aegean from the Sea of Marmora through Thrace and Thessaly, living much at Athens, and dying in Larissa, in Thessaly, in extreme old age. Numerous busts exist, the best and probably the oldest in the British Museum, dating from the II. or III. Century B.C. While not portraits, they are something much better and more helpful to us than any portrait. They are idealized representations of the kind of a man a physician should be, and was, in the eyes of the best and wisest of the Greeks as a race.

I cannot do better than quote the comments of Dr. Charles Singer, the well-known British authority in the History of Medicine: "Our glimpse of him is very dim and distant, yet we cannot exaggerate the influence on the course of Medicine, and the value for physicians of all time, of the traditional picture that was early formed of him, and that may indeed well be drawn again from the works bearing his name. In beauty and dignity that figure is beyond praise. Perhaps gaining in stateliness what he loses in clearness, Hippocrates will ever remain the type of the perfect physician, learned, observant, humane, with a profound reverence for the claims of his patients, but an overmastering desire that his experience shall benefit others, orderly and calm, disturbed only by anxiety to record his knowledge for the use of his brother physi-

cians and for the relief of suffering, grave, thoughtful, and reticent, pure of mind and master of his passions, this is no overdrawn picture of the Father of Medicine as he appeared to his contemporaries and successors. It is a figure of character and virtue which has had an ethical value to medical men of all ages, comparable only to the influence exerted on their followers by the founders of the great religions.''

As to (2) the *Method*, Hippocrates for the first time in the history of Medicine adopted in its purity the method of Induction, the process of reasoning from particular instances to a general law. The opposite system is known as the Deductive, in which argument is made from the universal to the particular, or from the more to the less general. As Singer has said, ''There is almost no type of mental activity known to us that was not exhibited by the Greeks and cannot be paralleled from their writings; but careful and constant return to verification from experience expressed in a record of actual observation—the habitual method adopted in modern scientific departments—is rare among the Greeks except in these early medical authors.'' This method may fairly be said to have disappeared soon after Hippocrates' own time, and to be lacking in the Alexandrian School already mentioned, which lasted from the III. Century B.C. to the VII. Century A.D., when it was destroyed by the Arabs. It was from this and other contemporary schools that the mediaeval and modern conceptions of Medicine as it existed among the Greeks were largely derived to this day, which made Francis Bacon, Lord Verulan, speaking of ancient science generally, say that ''She had become old enough to speak, but not old enough to bear children.'' He had in mind more the voluble, argumentative, purely theoretical systems and disquisitions of the later days of Greek Medicine. The most famous of Hippocrates' successors in the use of Inductive methods in Medicine may fairly be said to be our own English Thomas Sydenham, who was fighting as a trooper at the age of eighteen under Cromwell in the Civil War, while Harvey was the King's body physician and the chief medical advisor to the Royalist armies. This claim for Sydenham (1624-1689) may be fairly substantiated by this sentence from the beginning of his medical writings: ''I take the view that we shall go without hypothesis, and study the conditions as they appear, the process before the explanation.'' Hippocrates broke away from servile adherence to tradition and began the observations of natural phenomena. His writings include many clinical case histories after the best modern method, observed facts only without theory or comment, without any appeal to the Gods or reference to them, and untainted, as other case histories were, even those of the great Galen, by references to his own personal skill or erudition. He observed diseases, collected data, studied the accumulated results of experience and attempts to apply reasoned remedies. He noted the general physical appearance of the patient, whether bodily movements were normal, the presence or absence of pain, and the character of the excreta. He noted the character of the pulse, temperature, and respirations, and examined the sputum in cases of lung infections. He described the fevers of Thessaly and Thrace, phthisis, septicaemia, epilepsy, epidemic parotitis, the quotidian, tertian, and quartan varieties of malaria and other diseases. He was the first to notice that sometimes Potts' disease co-existed with tuberculosis of the lungs; he first noted the ''succussion sound.'' He divided diseases into acute and chronic, endemic and epidemic. He gave to Greek Medicine its ethical ideals. He laid great stress on professional dignity, and exhorted the physician to ''lead a well-ordered life,'' to ''let his disposition be that of a man of honour.'' (B.M.J., April 18, 1925).

Finally (3) the *Spirit* of Hippocratic practice. A study of the Hippocratic Corpus and of the ethics of Hippocrates and his followers as shown in the Aphorisms attributed to him, and particularly in the so-called Hippocratic oath, fills

the mind of a modern student with admiration. One can scarcely realize or believe that documents whose ethics are what one might almost call distinctively Christian could have been penned by men born in pagan communities centuries before Christ. One would like to reproduce the Hippicratic oath, but time and space forbid. Suffice it to say that, respected throughout the ages by Arab, Jew and Christian alike, the Oath remains the creed and watchward of the profession of Medicine. From the little book entitled the *Precepts,* one may select this,—"Where the love of man is there also is love of the Art," meaning that the love of one's fellows is a prerequisite to a genuine love of the art of Medicine. Or from the *Aphorisms,* "It is the duty of a physician, when he undertakes the care of a sick person, to place the patient, and the patient's friends, and all his surroundings, in train for the patient's recovery." The honesty and humanity and professionally sanctified common sense of this aphorism can have arisen only from the prolonged contact of kindly human intelligence with human fear and pain and grief. Even at this early day it was recognized by the thoughtful and intelligent of the profession that its first duty to the community which maintains it is to provide it with moral support. All drugs and other forms of treatment and surgical intervention were thus early recognized as only means to the vastly greater end.

Birth Marks.

J. Harold Couch, M.A., M.B.

The word "naevus" is loosely used to cover all birth marks, stains, or blemishes, but it is not a good word, because there are some 25 different "naevi" and because it is used by different writers in quite different senses. An effort should therefore be made to be more accurate. About 90 per cent. of birth marks are either haemangiomata or melanomata, so if we confine our attention to these two forms, we shall have some idea of the more important points in connection with most birth marks.

Haemangiomata.

Definition. — Haemangiomata may well be defined as "tumors with actual new formation of blood vessels or proliferation of blood vessel walls." Lymphangiomata are identical except that they are referred to lymph vessels. From this definition it will be seen that a haemangioma is to be regarded as a true tumor and so the terms "varicosities" and "aneurysmal dilation" sometimes used are incorrect.

Distribution. — Haemangiomata are the commonest tumors of infancy. They vary in size from a mere speck to half the body surface. Sometimes they have a peculiar absolute unilateral distribution covering one-half of the body and stopping short at the mid line both front and back. "Haemangioma unius lateralis." Commonly they seem to have an intimate connection with a nerve and follow its distribution faithfully as for instance one or other branch of the trigeminal. In depth they vary. Some are confined to the skin only. Some go into subcutaneous tissue. Some go right down to underlying bone. They may originate in, or spread into any tissue; and are not often fatal unless they are found in the brain, larynx or heart.

Growth.—The manner of growth of these tumors is most peculiar. They are present in the new-born baby, but often take several days to darken and become obvious. They may remain stationary in size or may grow with the child or may grow more rapidly than the child. They show, however, a marked tendency to diminish after a time and may do so at any period. This retrogression is often peculiarly associated with the first

or second dentition or with puberty, so that at these times a natural cure may occur. This cure is brought about by an increase in the connective tissue between the blood vessel cells of the tumor which results in their narrowing, and also effects a stenosis of the entering vessels if such are present.

Origin.—To understand the origin and nature of haemangiomata we must turn to the embryology of the vascular system. In the vascular layer of the embryo special endothelial cells appear in groups. These are known as the blood islands of Pander. These tiny groups of endothelial cells become rods and the rods become small tubes. Then they come together and form a fine network of empty tubes which correspond to the peripheral capillaries. Now, sometimes a small group of tubes fails to unite at the right time with the general circulation. It goes on and developes independantly and is ostracized by the rest of the tubes which did join to become the capillary system. It cannot join after a certain time, but goes on to become a haemangioma.

Varieties.—From the preceding paragraph it is clear that haemangiomata are not at first connected with the general circulation and so do not contain true blood. There are, however, three varieties of haemangioma. First, the growth may remain quite separate from the circulation and may remain in its original capillary condition containing modified blood. This form is known as "capillary haemangioma," and constitutes the common "port wine stain." Or secondly, the endothelial cell lining may proliferate both inside and outside the vessels and so obliterate the spaces causing the tumor to become solid. This is the "compact haemangioma." Or, in the third place, the growth may be subjected to trauma or pressure and at some point the blood vessels of the general circulation become continuous with the spaces of the tumor and normal blood is poured in at a pressure greater than that previously existing. The weak septa between the blood spaces are broken down and disappear, giving place to large sinuses filled with normal blood. This is the "cavernous haemangioma" and is the form from which severe haemorrhage may occur.

So we see that the capillary form is the original or first stage of all, and it goes on to compact or cavernous. It is also readily seen that in the same tumor we may find capillary areas co-existing with compact or cavernous, but that it is very rare to find compact and cavernous areas together.

Treatment.—One should always consider the chance of natural cure up to puberty before adopting any form of treatment. If treatment is decided on the most generally satisfactory form is to excise the whole growth if possible. This can easily be done if it is not too large and is situated on the shoulder or buttock or some such accessable place with loose skin. On the face excision may give the best cosmetic results. Cases have been successfully removed that covered the whole area of distribution of the second division of the fifth nerve, and the area covered with skin grafts, giving excellent results. Carbon dioxide snow gives good results in growths confined to the skin and not exceeding two inches in diameter. In an infant one application for 20 seconds is enough. The capillary form responds well to radium, but in some patients an increased deposit of melanin follows the cure of haemangioma by radium so that on the face an undesirable brown stain may remain. Radium is, of course, only useful in superficial forms of tumor. Electrolysis gives good results with some—especially the capillary type. The positive needle is plunged into the centre of the growth and the negative pole is moved from place to place. The earliest reaction to the treatment by electrolysis is wide swelling. This should be borne in mind in treating growths in the neighborhood of the tongue, lips, and mouth, for fear of asphyxiation. Cure affected in all these forms of treatment is an artificial imitation of the process which occurs in the natural cure. Damage is produced which heals by fibrous connective tissue

which contracts and obliterates the blood spaces.

The ideal treatment as mentioned above is excision, but only if the whole growth can be removed. One must always stay outside the growth and the blood vessels should be made to stand out by traction and should be clamped and tied before dividing. No undue bleeding is encountered, but if the tumor is cut into it practically never stops bleeding. The only exception to this rule is in the case of a haemangioma involving the lips. It is permissible here to cut into the growth because it is possible to clamp both ends and to control the bleeding by deep through and through sutures.

Mention should be made of frontal haemangiomata which may cover a frontal meningocele and give rise to unpleasant complications if treatment is injudiciously instigated. The diagnosis should be made by observing variations in tension as the child cries and similar signs. Haemangiomata involving the eye-lids should not be excised because the skin is so delicate there that it is impossible to get a really satisfactory graft. They may be treated by one or the other methods or seared with a dull red cautery to cause blanching and contraction.

Haemangiomata can be treated, but must always be approached with due respect and carefully thought out. The treatment once decided on must be whole-hearted and thorough.

Melanomata.

The other large group of so-called naevi are the melanomata.

Definition.—These are tumors arising from the deeper layers of the skin and containing melanin or melanogen.

The Pyrocatechal Equilibrium.

Melanogen is a colorless pyrocatechal derivitive which when oxidized, becomes melanin—the normal body pigment. But there is another related colorless pyrocatechial derivative which on oxidation becomes adrenalin. So melanin is related to adrenalin and has nothing to do with haemoglobin or iron containing pigments in the body.

This pyrocatechal group maintains a very interesting equilibrium in the body. All the mother substance may go to form melanin, as occurs when the adrenal glands are destroyed and we get the excess of pigment showing as the typical bronzing of the skin. A similar condition may occur naturally, both in man and all the lower animals, when for some unknown reason all or most of the pyrocatechal goes to form pigment and we get the condition of "melanism." These are the beautiful mysterious "black tigers" or "black wolves" of adventure tales. Or the reverse may occur. All the mother substance may go to form adrenalin, leaving none for pigment, and we have the condition of "Albinism"; the pure white hair and pink eyes, which is even more common among the lower animals as well as man. A very excellent and interesting series of specimens illustrating both melanism and albinism in animals and birds is to be seen in the Natural History Museum at South Kensington, London.

Origin.—The melanogen is converted into melanin in the melanoblasts, which are prickle cells lying in the basal layer of the skin. Melanophores are simply large endothelial cells which may be found to contain melanin. They have, however, nothing to do with its formation and are merely engaged in carrying it away as, for instance, when the summer tan fades.

Varieties.—First of all for some unknown reason the melanoblasts may become unduly active at some one point and melanin is deposited, giving us a "smooth mole." A perfectly benign, harmless thing as long as the cells containing melanin are still in their proper layer of skin. Or secondly, these cells may increase in number and form a little core or plug in one of the convolutions of the basal layer of skin. This stretches the underlying connective tissue which being elastic reacts and gradually pushes the little plug upwards and the

smooth mole is now a warty mole or "acanthotic melanoma," from the Greek word meaning thorn or spike. These also are quite benign and harmless as long as their base is still well delineated by the basal layer or skin cells.

Or in the third place the pigment bearing cells may penetrate deeply and be found deep to the true skin in connective tissue. They are often found here retaining a slender connection with the basal skin. As long as this connection is maintained they are benign; but it is so readily severed. This deep type of melanoma is dangerous. The cells have penetrated the basement membrane and at the time, often following trauma or irritation, they may break loose and go on their way independently. The growth has become malignant.

These deep melanoblasts may be uncoloured or coloured, according to whether they contain melanogen or melanin. If, therefore, the section is oxidized when melanoma is suspected a perfectly clean, white tumor mass may show up loaded with melanin. This explains the paradoxical "colourless melanoma."

As soon as the melanoblasts leave the deep layer of skin and get into the connective tissue they find themselves released from the flattening influence of all cells concerned in the skin and proceed to become spindle-shaped or polyhedral. A group of spindle or polyhedral cells deep to the skin resembles a sarcoma very much and these tumors were for a long time spoken of as "melanotic sarcomata." Their origin in the deep layers of skin, however, put them among the carcinomata. No matter how much they may resemble carcinoma cells, they often revert to typical prickle cells when they reach the lymph glands.

The melanomata are tumors of the skin. There are three primary forms: flat, warty or deep. Any of these may be benign or malignant according to the relation of its base to the deep layer of skin. Being a skin growth, all skin appendages may be involved, so we have hairy moles, or scaly moles, or sweat gland moles, or sebaceous gland moles. The confusion which often surrounds these varieties is unnecessary. They are all essentially the same. Melanomata may be found in deep organs which are embryologically associated with ectoderm—such as central nervous system, or adrenal cortex.

Treatment.—Melanomata are probably no more apt to become malignant than any other area of skin *if they are not subjected to irritation.* They are, however, more apt to be irritated; particularly the warty variety, and once they become malignant they are one of the most deadly tumors known.

Considerable judgment is required in treatment. It is infinitely better to leave them severely alone than to remove incompletely because the trauma of an imperfect operation is just the thing to cause a very malignant recurrence. Excision, if undertaken, should be wide and the edges of the skin undercut because the tumour belongs to the deep layers of skin. If it has become malignant it spreads so rapidly by metastastes that treatment is almost hopeless. Wide removal with block dissection of deep fascia containing lymph vessels and area lymph glands followed by radiation may be undertaken as offering an only chance.

Focal Infection.

(Paper Read by L. R. Angus, B.A.,. 2T8, Before a Meeting of the A.O.A., February 20, 1928).

In no other Art or Science than medicine does the old statement that "history tends to repeat itself" hold so true. Hundreds of years ago when the cause of many conditions was not as well understood as at present, in cases of particular difficulty, assistants skilled in the black arts were summoned, who for the relief of the patient performed incantations and magic spells, usually accompanied by the application of hot irons or other similar persuasives to the demon suppposed to be causing the condition by his residence in the patient's body. To-day we have advanced far from these primitive efforts. In abstruse cases now we summon not exorcists but consultants, and after lengthy discussion, and the repetition of *our* pet charm which has of late become "focal infection," we violently remove the victim's teeth or tonsils, or perhaps his gall bladder or appendix. It cannot be denied that this procedure is carried out with much more pomp and circumstance than was our ancestors' simple necromancy, but it is often questionable if the results obtained by our method surpass theirs. I am not insinuating for a moment that focal infection plays no part in disease; in fact it is the purpose of this paper to prove the contrary; but until we stop the indiscriminate "slaughter of the tonsil" and before eradicating foci, carefully consider the pros and cons *in that specific case,* until, in other words, we are really prepared to face the facts that while the extirpation of the localized infection plays a part in *some* diseases, it still is far from being the "philosopher's stone" in medicine; up till that time we have no cause to vaunt our superiority over our less sophisticated predecessors. It is well to remember in this connection that although "the roads in some localities might be paved with molars and bicuspids, while the banks could be studded with tonsil glands," yet in those same localities the halt, the maimed and the blind are, like the poor, always with us.

What, then, is focal infection? According to Dr. Holman, in an interesting article in the Archives of Pathology, February, 1928, the term implies: (1) That there exists, or has existed, a circumscribed area of tissue infected with pathogenic micro-organisms (i.e., a focus of infection); (2) That the lesion is bacterial in nature and as such is capable of dissemination, and (3) That from the focus has resulted systemic infection or infection of other contiguous or non-contiguous parts.

It will be noted that in the above definition a very rigid distinction is made between the terms "focus of infection" and "focal infection." It is of paramount importance that this conception be kept in mind, for while the former (focus of infection) is a static condition, presenting only a potential danger to the individual, and being so common an occurrence as to be almost normal, the latter is an actively progressing process tending in its more serious forms towards a disabling or even fatal termination, and even in its mildest manifestations militating against the health of the patient.

We may well ask ourselves at this point what can be the cause of such a widespread influence. A focus of infection is, it is recalled, "a circumscribed area of tissue infected with pathogenic organisms." Now it is obvious that such an area can of itself cause no general disturbance. If remote effects occur, therefore, they must be due to some readily transmissible substance from the focus. This substance can, of course, be only one of two things, either the bacteria themselves or their products. It is not our purpose in a general paper

such as this, to go minutely into the bacteriology of focal infection, so that we shall consider only one type of organism, the streptococci, they being by far the most commonly found microorganism in these lesions: what we shall say about this group applies practically verbatim to the other pathogenic invaders. If bacteria are to form a focus in the first place they must be of low virulence for that particular tissue, for otherwise we should have on invasion either an acute process with a local classical inflammatory reaction, or a rapidly spreading and invariably fatal septicemia. These comparatively avirulent organisms of focal infections certainly do not form products as dangerous or toxic as the more deadly diphtheria bacillus, for example, and it is even a moot question whether they produce toxins at all or not. It is true that Clark and Fenton in 1918 claimed to have obtained a fairly potent toxin, but their work does not agree with the findings of such previous observers as Aronson (1902), Simons (1904), Braun, 1912), and was not confirmed by Zinsser, or by Zinsser Parker and Kuttner in 1920 and 1921, following exactly the same technique. All these investigators (except Clark and Fenton) obtained comparatively innocuous extracts which fitted into no known grouping and for want of a better name were called by Zinsser "X" substances. The mere fact that such discussion and divergence of opinion can exist tends to show that no very important toxins are produced in focal infection, and that it is in the main at least bacteria escaping from the foci which are responsible for the symptoms. How, then, do the bacteria travel from the primary focus to the sites often in distant parts of the body where the secondary lesions occur? Of the three possible routes (1, blood stream; 2, lymph stream; 3, direct extension), the third is ruled out at once by the considerable distance that usually separates the two lesions, leaving no explanation by simple extension possible; the lymph path has been fairly definitely excluded by the studies of Marifred, Digby, Noetsel and others, who have shown that the lymph nessels not only do not readily transmit infections, but actually act as barriers to their spread. Now, having excluded two of our three possible factors, it follows that the third, however improbable it may seem, must be the correct explanation. It was indeed thought that even this hypothesis was untenable, for attempts to culture organisms from the blood stream met with failure after failure, but recently with improved technique, many more positive results are being obtained, so that we may hope with a still further improvement to locate in each case the infection with much greater ease.

Having demonstrated above that the spread of infection from the original focus is by means of the blood stream, we now propose to discuss the reasons for the bacterial selection of certain sites for Localization, both of the primary and secondary invasion. In *any* infection two factors must always be taken into account, viz., (1) the potentialities of the organisms and (2) the resistance of the tissues which they invade; so that it follows that in the specific case of *focal* infection, the attempt to explain its development and various phenomena must include these considerations. Bearing in mind, then, that *both* factors are active, our only difficulty lies in assigning to each its proper role. The view that holds the precedence in point of time is that promulgated by Rosenow of the Mayo clinic, and just at this point it may be profitable to wander a little from the beaten track to discuss the connection of this worker with the modern theory of focal infection, a relation which is often misunderstood. The name "Rosenow" is no more synonymous with "focal infection" than that of "Darwin" with "evolution." Both these men formulated a theory which has been in each case gradually recognized as true, but both of them, to elucidate their theory, invented sundry explanatory hypotheses (the one "survival of the fittest" and the other "elective localization) which are certainly open to some question. Now, to return

to the thread of our story, Rosenow's theory of elective localization was the first attempt to explain the phenomena of focal infection in a logical way. He supposed that localization was due to an inherent property of the bacteria themselves, that is to say that these organisms had a preference for a certain medium, such for example, that found in the appendix, and that they only developed when planted in this area. The remainder of the organisms which were inoculated at the same time and scattered throughout the body in the blood stream not finding a suitable medium, died out, and only those survived which were in their own environment. This implied, of course, that there were certain varieties of bacteria (mainly of the great group of streptococci) which had developed these particular affinities. To settle this question, organisms were removed from the specific lesions in man, cultured and then injected into experimental animals in which it was claimed that a high percentage of corresponding lesions occurred. Dr. Holman has made a very complete and careful analysis of Rosenow's results, using that worker's own published reports, and criticizes his findings for the following reasons:

(1) No attempt whatever was made to control the diet or environment of the animals.

(2) The doses of bacteria used varied widely in different cases and in some more than one injection was made.

(3) There is no record of a possible secondary infection of the animal itself being considered as a factor.

(4) There are marked discrepancies between the number of animals reported in experiments, and those included in Rosenow's tables.

(5) Very few cultures were taken directly from the actual site of infection in man, more being from the oral cavity.

(6) In intravenous animal injections a number of factors not evident in ordinary infections in man are apparent, such as shock, sensitization or resistance with repeated injections, etc.

With all these reservations, Dr. Holman has used Rosenow's own figures, and by a rearrangement has been able to show that it is "roughly a 50% chance whether any particular localization occurs with a 'specific' or 'non specific' strain." His final conclusion is that "Elective localization as an hypothesis to explain the occurrence and incidence of focal infection in man is insufficient."

Since we have now excluded the bacterial factor as being of chief importance in the localization of organisms in the human body, it remains to discuss the part the tissues play in this great question. It was stated above that the chief if not the only means of transfer of infection from the primary foci was by the blood stream. This fluid is constantly being agitated and mixed through the action of the heart, so that any infective organisms (or any other small enough particulate matter) will tend to be evenly distributed throughout. This being the case, an organ with a rich blood supply (the kidney for instance) would get a larger number of organisms than a poorly supplied tissue like tendons; if , moreover, there be a poor circulation (as in heart failure) so that the blood flows less rapidly, there will be a greater chance of the bacteria settling out, and the same will supply to any organ supplied with terminal (non anastamosing) capillaries such as the heart; or in an organ actively at work, such as the muscles, where according to Krogh, capillaries are constantly opening and closing. These provide what might well be called anatomically predisposing areas for localization, the points being: (1) Those areas with a rich capillary supply; (2) Those in which stasis occurs; (3) Those with terminal capillaries, and (4) Those actively at work.

In discussing the role of the body tissues proper we shall begin with the axiom that a healthy tissue cell and pathogenic bacteria are mutually exclusive, which means that pathogenic bacteria cannot thrive and multiply in the presence of healthy tissue cells. This does not mean, of course, that all cells are equally resistant to the attack of bacteria, or are equally aggressive in dealing with them. The polymorpho-

nuclear leucocytes of the blood show the most vigour in attack and the reticulo endothelial cells and lymphocytes stand high in the list, so that we might add this point to our list of anatomical factors, it being, in this case not a predisposition, but a definite resistance to localization.

Now to discuss the factors which will tend to make the ordinary tissue cell unhealthy, for on these factors the site of location of foci will largely depend. We may postulate, I think without argument, two such conditions, namely, trauma and overwork. No one would deny the influence of the first, and as to the second, we have only to refer to A. V Hill's monograph on "Muscular Movement in Man" to learn the effect of over strain in the so-called "irreversible reaction" of injury.

It is an old statement, but nevertheless a true one, that "no man liveth unto himself," and it applies with even greater force to the individual cell. We know that a single cell placed in a vacuum will surely die. Cells even of the simple and comparatively autonomous type found in the amoeba must have certain external supplies to live. These supplies we may call nutrients, using the term in a very general sense. The one-celled animalcule secures its food from the water in which it lives; the individual cells of the higher animals, including man, derive theirs from their blood-stream. Deficient cellular nutrition may therefore be due to either a qualitative defect in the composition of the blood (which may be in oxygen, in hydrogen ion concentration, in metabolic products, or in the presence of some actively toxic material), or it may be due to a quantitative defect (i.e., an inefficient circulation of otherwise normal blood). In discussing the latter we must remember that the unit of circulation as far as the cell is concerned is the terminal blood vessels, the capillaries. These, as Krogh and others have shown, are fearfully and wonderfully constructed to supply the needs of the tissue cells in which they are imbedded. This worker has further demonstrated that the capillaries in one location will react to certain distant stimuli, some of which we shall now proceed to describe and to discuss their relation to the formation of the secondary foci of infection. If a capillary containing blood in which bacteria are floating suddenly contracts, these organisms will be arrested in the tissues and may under the conditions outlined above multiply and produce a localized area of infection; and if on the contrary, the flow through the capillaries is slow, due to either a generalized poor circulation or to some local obstruction of the part, then the bacteria as in a sedimentation tube will have an opportunity to settle out, and possibly, if the soil be suitable to develop into a focus. Since the volume of blood in the organism at any time is a constant, and since blood itself being a fluid, is incompressible, any constriction of the capillaries of one area implies a corresponding compensatory dilation elsewhere, so that no so-called "local" reaction is as simple and self-limited as one might suppose. According to Krogh the following types of stimuli will produce local and distal capillary reactions.

(1) Muscular exercise causes not only dilation of the existing capillaries, but the appearance of fresh vessels formerly closed in the muscles concerned, and this is followed at the termination of the exercise by contraction.

(2) Nervous or emotional control, as seen in the flush of embarrassment, or the pallor of fear.

(3) Light will produce a local dilatation, commonly observed in the sunburn of the summer holidays.

(4) Local applications of heat produce dilation, while those of cold constriction, as is well illustrated by the commonly-used therapeutic measures of mustard plaster and ice bag respectively.

(5) Certain toxins may be concerned. Krogh's experiments were mainly with histamine, but the toxin of diptheria, exophthalmic goitre, pernicious anemia and possibly the high sugar of diabetes should be considered.

(6) Difference of pressure between the capillaries and the surrounding tissues is an important factor, a point easily demonstrated in the use of cupping for the relief of deep congestion.

With this brief outline of the pathological (or should it be physiological?) etiology of focal infections in mind, let us proceed to a consideration of the various situations occurring in everyday life which may give rise to these conditions.

Perhaps the most commonly operative cause is the daily alternation of extremes of heat and cold to which every one is constantly subjected, especially in the winter time. In the torrid atmosphere of an overheated room the surface capillaries will be dilated, and since most foci lie on the surface of the body (teeth and tonsils for example) the increased circulation in these areas will tend to sweep bacteria from these areas into the blood stream. Thus we have produced the ideal condition for the development of secondary foci, namely, circulating bacteria and dilated capillaries. On leaving the warmth of the indoor temperature, and emerging into the cold, an instantaneous contraction takes place and bacteria may be caught in the constricted capillaries as described previously. This factor, as Dr. Holman points out, may play a very important part in the etiology of the common cold. The effect of heat and cold successively is perhaps far better illustrated in the case of athletes. In this case we have the combined effects of general dilation due to violent exercise with that due to external heat. We may suppose that now the blood will contain bacteria from the various foci. As soon as the exercise is over, what happens? In the first place the muscles do not require so much blood, so that many of their capillaries will close completely, and the same reasoning probably applies to that most important organ, the heart. This action may be increased, if the athlete is inexperienced or incautious enough to attempt rapid cooling by the use of a cold shower or a swim. This, of course, is the same action as that mentioned above under the heading of alternate heat and cold, but in this case there is a second and very much more serious factor, that of overstrain, once again, in particular, of the heart. We thus have all the conditions required for the spread of infection. This, of course, is much less likely to occur in the trained athlete than in the sedentary desk worker at his evening's tennis, but it nevertheless presents a very real danger to both. The lowered resistance of the body generally due to prolonged exposure to cold and damp is too well known to require further comment.

The part which nervous reflexes, such as worry and anxiety, may play in focal infection is difficult to evaluate even in these days of intelligence tests and infant schools, but some very suggestive findings in the gastro-intestinal tract indicate that its role is by no means insignificant. It is a well-established fact that a man suffering from worry, fear or anger has but a poor appetite and an inefficient digestion, if not an actual dyspepsia. In Ryles' monograph on "The Gastric Function in Health and Disease" this condition is laid to a change in the irritability of either the afferent or efferent side of the stomach reflex arc so that minor stimuli which formerly caused no sensation will now do so. The same mechanism would lend colour to the view propounded by Reeves, Sennett and others that the lesions of gastric and duodenal ulcer are associated with a local circulatory disturbance in the capillaries and smaller arterioles. Hutchison, of Hutchison and Rainy fame, definitely states that the ulcers are due to focal streptococcal infections. In support of the view that anxiety states may be connected with these lesions, we have the well-established fact that over 80% of the lesions are in males and that according to Ryle the typical case like Cassius, "has a lean and hungry look. He thinks too much."

Such men *are* dangerous, not to others, but to themselves.

And now for a third and most important factor in the development of focal infection, that of diet. On this sub-

ject a whole paper or even a book might well be written, but for the sake of brevity we will devote the remaining space at our disposal entirely to one small but important aspect of the question, namely, the effect of diet deficient in vitamine B. This is the subject of a very interesting and instructive paper by Dr. Rowlands of the London Hospital, appearing in the proceedings of the Royal Society for September, 1927. The avowed purpose of the paper is the discussion of the etiology of Rheumatoid arthritis, a subject long believed to be the especial province of the specialists in focal infection. Rowlands was first attracted to the question by the observation of rheumatoid arthritis in pigs which rapidly cleared on feeding diets high in vitamine B. He had previously observed that bacilluria was frequent among human rheumatoid cases; in January, 1927, he reviewed 100 cases, taking cultures of the urine in each case. Of these 89 grew B. coli; 6 streptococci; 1 paratyphoid, and 4 were negative. To check these results 100 healthy vitamine-fed rats were killed, their bladders dissected out aseptically and the urine cultured; they were in every case sterile. The urine of 40 healthy medical students was collected in sterile containers, but without any further precautions, and cultured, and of the 40 only 4 were positive. Of these 4 one showed sugar, one had an appendectomy a short time after the experiment, one was suffering from boils and the fourth was neurasthenic. The next step was to investigate the intestinal conditions of rats fed on deficient diet. This was done by means of the usual barium meal and X-ray. In all cases a marked dilation of the stomach and colon with stasis was seen; and on histological section a thinning of the wall of the organ to about one-half of the normal rat. Similar changes are stated to take place in human cases of rheumatoid arthritis. He also showed that the development of bacilluria on a vitamine deficient diet was a matter of time, for rats partially deprived of this vitamine for 4 weeks all showed negative cultures, while those deprived for 9 weeks were positive. Bacilluria occurs in man in every case of diabetes he has examined and in all of 4 cases of high blood pressure. Rowlands states that on giving high vitamine B diets and autogenous vaccines the blood pressure of these cases dropped from 200-250 to about 150 though he does not say whether the B coli disappeared from the urine or not. He claims that in one carefully observed case of rheumatoid arthritis, the disappearance of bacilluria was found followed by relief of pain and complete clinical cure. Rowlands believes the condition to be of the nature of a focal infection from the urinary findings. His treatment therefore consists in the careful eradication of all foci, the use of high vitamine B diet (he uses a special detoxicated wheat embyro preparation) and of autogenous B coli vaccines.

These represent only a few of the many common situations of everyday life which aid in the establishment or spread of focal infection. Limitations of time and space forbid the mere mention of numerous others, but it is hoped that in the above discussion enough has been said to point out the frequency and danger of this important condition.

Muscular Tonus, Its Relation to Post-Encephalitic Parkinsonism.

ATROPINE AND HYOSCINE TREATMENT.

T. Allen Sweet, M.B., George Brown, Memorial Fellow, 1927, Department of Pharmacology, University of Toronto.

Muscular tonus may be defined as that constant state of contraction present in all muscles, dependent on the integrity of their reflex arcs. Our best conception of tonus is in terms of length of muscle fibres rather than in the tension of them.

In this paper we will deal only with skeletal muscle tonus, there being some points of difference between it and the tonus occurring in smooth muscle.

Let us now consider the paths of the tonus mechanism:

I. Simple Reflex Arcs.

The proprioceptive fibres entering the cord with the Dorsal root, come into synaptic relation with the internuncial neurone. There is in turn a synapse between the axone of this internuncial neurone and the Anterior Horn cell. This short reflex arc in man is relatively unimportant to tonus. It enters more importantly into the phenomenon of fatigue.

II. Spinal Proprioceptive Mechanism.

(a) Cerebral.
(b) Cerebellar.

(a) *Cerebral.* There are at least three neurones in this chain, namely: (1) Dorsal root ganglion; (2) Nuclei Gracilis and Cuneatus; (3) Thalamus.

(b) *Cerebellum.* This organ is known to play an important role in tonus in man. The afferent paths are: (1) Ventral Spino-cerebellar tract; (2) Dorsal Spino-cerebellar tract.

(1) Ventral Spino-cerebellar tract. The first neurone is in the Dorsal root ganglion and the impulses pass over the collateral and terminal branches of the dorsal root fibres to reach the posterior grey column and intermediate grey matter, from the cells of which fibres run to the cerebellum.

(2) Dorsal Spino-cerebellar tract. The first neurone is in the Dorsal root ganglion, and impulses over the collateral and terminal branches of the root, ramify about the nucleus dorsalis. From cells in the latter fibres run to the cerebellum.

2. Cerebellar connections of the vestibular nerve. The vestibular nerve conducts impulses from the semi-circular canals, saccule and utricle which are stimulated by movements and changes in position of the head.

The efferent impulses awaked in the cerebellum and by the afferent impulses converge on the Red Nucleus and influence the Anterior Horn cells through the Rubro spinal and Rubroreticular tracts.

The impulses received by the cerebral cortex can either exhibit their influence through the cerebellum, thence Red Nucleus or to Red Nucleus through Basal Ganglia and thence down Rubrospinal and reticular tracts.

III. Cerebral Mechanism.

Warner and Olmsted demonstrated that upon the ablation of one cerebral cortex (i.e., cortex of one hemisphere) there occurred a contralateral rigidity in both fore and hind legs, with an inconstant increase in extensor tone on the ipsilateral side. There was, however, no rigidity in the neck or tail. From this they made the hypothesis of an "inhibitory" path the interruption of which led to decerebrate rigidity. This suggested that the cerebral cortex plays a definite role in controlling tonus.

Warner and Olmsted further found that subsequent sections caudal through the Thalamus, led to no increase in tone. They showed the cerebral cortex to be composed of two distinct portions each with a different and independent function. In cats they demonstrated that destruction of the motor cortex led to

paralysis with no definite tonus change, while destruction of the frontal portion to no, or only very transient, paralysis and marked derangement of postural tonus. Careful stimulation of the cut frontal cortex caused an inhibition of extensor rigidity on the opposite side. By successive sections this inhibitory path was traced through the Internal Capsule and thence down the mesial fifth of the cerebral peduncles. The path goes uncrossed to the Pons and thence to the cerebellum via the middle peduncle of the opposite side. Baily & Holtz have since shown that the path leaves the cerebellum via the superior peduncle and terminates in the Red Nucleus. The presence of fronto-cerebellar-pontine tract is thus quite well established.

We know that the Basal Nuceli play a most important part in the tonus mechanism. By the term Basal Ganglia we signify the Corpus striatum (Lentiform and Caudate Nuclei) and the Amygdaloid Nucleus and Claustrum. A few authors include under the term Corpus striatum only the Globus Pallidus (part of the Lentiform). That there are numerous connections existing between the individual Basal Ganglia, and the latter in turn with the cerebral cortex and cerebellum, has been amply shown by both neurological and physiological methods. Through the Rubro-spinal and Rubroreticular tracts the Corpus striatum can influence the muscles.

There remains another possible component of the tonus mechanism. It is a peripheral one. Two conceptions have been advanced: (a) Flow of non-contractile impulses to the muscle from anterior horns, i.e., ones so weak or of such quality as to keep the muscle in a constant state of mild contraction or tonus, or (b) two sets of muscle fibres each with a separate innervation. That is, contractile fibres supplied by the ordinary motor nerve and "plastic" fibres supplied by the sympathetic. Hunter and Royle by their work support the view of fibres being supplied by the sympathetic.

Unmyelinated nerves morphologically identified with sympathetic fibres have often been described going to certain skeletal muscle fibres. There has been no general agreement as to the quality or functional importance of these. Hunter & Royle believed postural tonus as to have two components as mentioned above, viz., Contractile and Plastic elements. By Plastic Tonus we mean that component through which a muscle can take up a new length without change in tension. Kerper & Kuntz confirmed Hunter & Royle's work and obtained a decrease in the tonus of muscles whose sympathetic supply was cut. This, however, was only obtained (and in their work actually measured) under a degree of anaesthetic sufficent to depress the somatic proprioceptive mechanism. If the somatic proprioceptive mechanism was not so depressed it compensated for the loss of sympathetic control. This may well explain why many investigators have failed to demonstrate a relation between the sympathetic system and tonus.

The resistance of a postural muscle is greatest on passive movement when that muscle is nearest its minimal length at rest (i.e., the greater the length the more easily it is possively stretched). Upon this the "Brake" phenomenon or "Bremsung" depends and is manifested in the sudden, at first slow, and then more rapid, giving way of a hypertonic muscle on passive stretching. This Brake Phenomenon is only present in a muscle whose reflex arc is intact.

Kerper & Kuntz plotted tonus curves using an ingenious apparatus and found the Brake Phenomenon absent after cutting the sympathetic supply, or upon the administration of 0.5% Nicotine solution 1-2 cc. dose. The Brake Phenomenon is also absent in muscles after death and also in various diseases, most notably Tabes.

The Brake Phenomenon is present after decerebellation and the tonus is reduced though not so markedly as after the sympathetic supply is cut. Thus impulses from the cerebellum and vestibular apparatus go out through the sympathetic fibres. It is reasonable to suppose from all this that the sympathetic

system subserves a minor role in tonus control, but that this role can be quickly and completely taken over by the somatic proprioceptive mechanism.

Pathological Considerations.

Derangements in skeletal muscle tonus occur in many diseases. In Tabes through the destruction of the Dorsal root region or posterior funiculus. In Paralysis agitans and Post Encephalitic Parkinsonism we have hypertonus. Let us examine more closely the state of affairs in Post Encephalitic Parkinsonism.

Parkinsonism is the sequelae which gives to Encephalitis lethargica its great clinical importance. The remarks following apply chiefly to this condition in adults, the manifestations in children are markedly different, taking the form of psychic derangements rather than tonus. Psychic phases are negligible or absent in the adult. In children co-ordination of the central nervous system is not yet complete.

In Parkinsonism there is found a destruction of cells in the Substantia nigra and Basal Ganglia. The tremour is probably due to a lesion in the lenticular nucleus. It is questionable whether the depigmentation, degeneration of neurones, demyelination, gliosis and slight vascular changes can be rightly interpreted as inflammatory.

Clinical Picture.

We get in this entity a variety of visceral and somatic disturbances with inhibition of movement, tremour, excessive salivation, outbreaks of sweating, abnormality in sugar metabolism. There is weariness with reduction of vigour, lethargy or insomnia. And early signs are more in the upper part of the body, i.e., face greasy, fixed expression, eyes staring, mouth a little open and a pool of saliva between the lower lip and the teeth. The head is held still, there is a reduction of the swinging of the arms in walking. The handwriting is small, especially toward the end of a line. "Clasp-Knife" or "Lead Pipe Rigidity" (which arises from the Brake Phenomenon) and is the sudden giving way of the muscle on stretching is present on passive movement of an extremity. Voluntary movements are slowly executed (Brady-Kinesia) both contraction and relaxation time lengthened over normal. The vegetative symptoms (salivation, etc.) can be explained upon the basis of a lesion in the higher centres for vegetative innervation (mid-brain and grey matter of third ventricle).

Treatment by Atropine and Hyoscine.

In Parkinsonism as in all neurological diseases there is superimposed upon an organic base a functional stratum of varying dimensions. Without doubt the symptom which most disconcerts the patient is his disturbance of movement. He possesses an unnatural slowness in executing hitherto quick and skillful movements of everyday life. This above all separates him from his fellow-men. All the symptoms are accentuated by fatigue and worry establishing a vicious circle. Hyoscine and atropine are now of definitely recognized value in this condition. Both drugs appear to act on the neuro-muscular mechanism, probably on the motor side and that centrally, thus improving his movements (by shortening muscular relaxation time) lessening his lack of vigour and inducing in him a general feeling of well-being and actual Euphoria. This relief is from an oppression, a real burden. We have thus primarily a neuro-muscular effect and secondarily a psychic one. The effect of these drugs on the postural reflex is important and interesting.

To elicit the postural reflex the foot is flexed upon the leg, thus obtaining a shortening from and an active contraction of that muscle, now followed by a slow return to the normal extensor position. In Parkinsonism the relaxation time of this reflex is greatly prolonged above normal. After hyoscine and atropine the relaxation time closely approaches the normal. Best results are obtained in cases with Brady Kinesia accompanied by postural hypertonus. If the case is complicated with pyramidal signs a poor result is obtained, for

the abolition of the postural reflexes will increase the pyramidal contracture still more. This postural reflex is a most important guide to treatment.

The drugs are given by mouth, atropine grs. 1/50 - 1/25 per diem (in divided doses t.i.d.) and hyoscine in slightly smaller amounts. The dosage in each case must be individually determined by the case, and the just sufficient amount continued permanently. No serious untoward effects have been encountered even after continuous administration of either drug over periods of several years. Patients vary, some benefitting more from the one drug than the other. In cases where hyperglycemia is present the blood sugar curve approaches normal by the use of these drugs. The explanation is not known. These drugs also, of course, decrease the drooling.

I am very much indebted to Professor V. E. Henderson for his help in the collection of material and presentation of this paper.

References.

1. Ranson—Anatomy of the Nervous System.
2. Starling—Textbook of Physiology.
3. Meyer & Gottlieb (trans. Henderson) Experimental Pharmacology.
4. Cushny—Pharmacology and Therapeutics.
5. Ivy McKenzie—Epid. Encephalitis, B.M.J., Sept. 24, 1927, p. 532.
6. Greenfield—Pathology of Enceph. Leth., B.M.J., Sept. 24, 1927, p. 535.
7. Reddoch—Chron. Enceph. Leut., B.M.J., Sept. 24, 1927, p. 537.
8. McNab Marshall—Mental aspects of Encephalitis Lethargica, B.M.J., Sept. 24, 1927, p. 539.
9. Cruchet—Brady Kinesia and Hypertonus in Post-Encephalitis Parkinsonism, B.M.J., Sept. 24, 1927, p. 541.
10. McGowan, Harris, Mann—Hyoscine in Post-Encephalitis with special reference on sugar metabolism, B.M.J., 1926, 1, 779.
11. Hall—Post-Encephalitis Parkinsonism: Belladonna treatment—B.M.J., 1926, 1, 127.
12. Kuntz & Kerper—Experimental Study of tonus in skeletal muscles as related to the sympathetic nervous system. Am. J. Physiol., 76, p. 121.

Hodgkin's Disease.

(*By Robert A. Cleghorn, 27*8)

In this paper it is planned to consider some of the significant features and literature bearing on Hodgkin's Disease. Special reference will be made to the pathology. A thorough knowledge of this aspect is of prime importance in the understanding of the disease and without which the etiology cannot be solved. Limited space renders anything more than brief mention of the recent work on the etiology prohibitive.

History and Nomenclature.

The first man to note the condition was Morgagni in 1769, but it remained for Thomas Hodgkin, demonstrator in Morbid Anatomy at Guy's Hospital, to thoroughly describe the disease. In his classical paper in 1832 on "Some Morbid Appearances of the Absorbent Glands and Spleen," he details seven cases; of these, five were probably lymph node tuberculosis, lymphatic leukemia, syphilis or lymphosarcoma. Two, however, were undoubtedly genuine examples of the pathological entity now recognized.

No interest was excited till 1865, when Sir Samuel Wilks in his paper on lardaceous diseases included the peculiar enlargement of the lymph glands in a special division. Finding that this included some of the cases orginally

described by Hodgkin, he added an acknowledgment to that effect. By 1865 he had collected fifteen such cases and in a second report applied the name "Hodgkin's Disease" in honour of his colleague on the Guy's Hospital staff.

During the next three decades, the clinical details of the disease were well worked out, but much confusion still existed in spite of the fact that Wilks, Trousseau and Wunderlich differentiated it from leukemia, syphilis and tuberculosis. Relationship was claimed to lymphosarcoma and tuberculosis. The variable nomenclature added to the uncertain comprehension of the disease. Sternberg estimated seventeen titles existed at one time.

Finally the histopathological changes in Hodgkin's Disease were established due to the classical reports of Sternberg in 1898 and Dorothy Reed in 1902, and the disease recognized as a pathological entity. This did much to clarify the situation and dispose, to a certain extent, of some of the multitude of names applied to the conditions. Of these, four remain in more or less common use. Lymphadenoma, lymphogranuloma, lymphogranulomatosis and Hodgkin's Disease. This eponymous title avoids any hypothesis as to the etiology and therefore justly deserves its position as the most widely used term.

Etiology.

Hodgkin's disease affects males approximately twice as often as females. It occurs chiefly between the ages of 15 and 35 years. Five and a half months (Fabian) and 76 years (Ziegler) are the reported extremes. There is no known factor having any appreciable influence on the occurrence, though focal infection is frequently associated.

The relation of Hodgkin's disease to tuberculosis is striking, but the results of animal experimentation have not been conclusive. Recent work of Fraenkel and Much (1923) has greatly strengthened the case for an atypical form of tubercle bacillus as the etiological factor.

Bunting and Yates claim a form of diphtheroid organism as the causative agent in Hodgkin's disease. Their successful results in animal inoculation have not been confirmed by Mellon and others.

The neoplastc explanation of Hodgkin's disease has many staunch and worthy adherents, but this basis is far from universally accepted.

The reticulo-endothelial system has been advocated strongly as the primary tissue affected and the pathology of the disease dependent on a vagary of this system. Piney and others offer stout arguments to support this contention.

Finally, Symmers comes forth with a brand new theory. He claims that Hodgkin's disease is an affection of the hemopoietic system, the pathology of the glands being explained on an embolic basis, the large cells coming from the bone marrow and being filtered off in the lymphoid structures. He makes anology and contends relationship to myeloid leukemia with very convincing arguments.

Pathology—Gross and Histopathology.

Before discussing in detail the distribution of the lesions in order to gain a concepton of the extent and type of involvement of the tissues of the body and an idea of their relation to clinical manifestations, it is well, perhaps, to describe the gross and microscopic pathology of Hodgkin's disease as it appears in the lymph glands. Here the lesion is best seen and since the tissue changes are relatively the same everywhere the purpose is served.

In the early stages of the disease, the glands are soft, later hard, generally much enlarged. They may be lobulated, of white grey or red color and often show areas of necrosis. The glands do not tend to fuse as in tuberculous adenitis, but remain discrete, even after attaining a considerable size. They may, however, be bound together by a chronic peri-adenitis, occasionally the capsule in infiltrated and the surrounding tissues invaded. The character of the cut surface depends on

the stage. Early it has the medullary appearance characteristic of cellular hyperplasia and occasionally with congestion or haemorrhages, frequently with minute opaque areas of necrosis. The cut surface is white, greyish yellow or brown, depending on the amount of fibrosis, cellularity, necroses and haemorrhage. In later cases the gland may appear to be composed entirely by fibrous tissue so great the replacement. Then it is hard and small.

The first observable microscopic change in the lymph glands as Reid pointed out, consists in a proliferation or hyperplasia of the lymphoid cells. in this early stage these cells correspond closely to the cells of the germinal centres in morphology. This change can be hardly considered specific as the same chronic hyperplasia is seen in response to the long continued irritant stimulus of chronic inflammation or nearby malignant growth. Soon, however, there is a partial or complete loss of architecture of the gland and a proliferation of the so-called endothelial cells, which cover the reticulum of the lymphoid sinuses. These are larger and paler cells with elongated vesicular and palely staining nucleus. A contemporaneous destructive action of the lymph gland occurs and the lymphocytes and endothelial cells together with others to be described, spread to replace the normal tissue of the gland obliterating lymph cords and sinuses. The most characteristic feature of the lesion is the presence of the so-called Dorothy Reed giant cells. These are large cells many times the size of a lymphocyte and may have a single, large, round, vesicular nucleus with very prominent nucleolus or a bilobed or multi-lobed nucleus. These are round or lie close together. Their protoplasm is clear and outline usually ragged. These giant cells, according to Symmers lie loose and always partially or completely surrounded by a clear zone. MacCallum describes another type of giant cell showing many small nuclei arranged in a ring or horse-shoe. These are much closer he says to the sort found in foreign body giant cells or even to those of tubercle. In addition to the cells already described, there is often an abundant infiltration of the tissue by eosinophiles, plasma cells and polymorphonuclear leucocytes. This, however varies in degree nor is it entirely constant, particularly eosinophiles which Dorothy Reed once considered essential to the picture of Hodgkin's disease. By the time these cellular changes have taken place, a considerable hyperplasia of the fibrous tissue will be noticed. Areas of focal necrosis are almost constant features, particularly in rapid cases. Sclerosis continues and with its progression, there is a disappearance of the characteristic multitude of cells until there is left a dense mass of fibrous tissue with here and there only small pockets or nests of small cells as have been described. This sclerosis, it should be noted, differs from the gross thickening of the capsule and trabeculae in non-specific lymphadenitis and may undergo hyaline degeneration. Occasionally in some late cases the stroma assumes the local histological picture of spindle cell sarcoma, but without the same infiltrative growth or metastases. In this regard it may be remarked that at times the granulomatous process in Hodgkin's disease is found to penetrate the capsule and surrounding tissue. This fact is dealt with elsewhere. In fulminating cases the picture is modified somewhat. The adenitis and peri-adenitis are so severe that the skin overlying the glands become red and the surrounding tissues infiltrated by serum. The pathology is much the same, except for more abundant necroses and marked polymorphonuclear and eosinophile infiltration. Amyloid degeneration has been spoken of in connection with Hodgkin's disease and is seen chiefly in the liver and spleen.

DISTRIBUTION OF THE LESIONS.

Lymph Nodes.—These are invariably involved in Hodgkin's disease though to a variable extent. The following table is illustrative:—

Per cent. Involvement of Various Glands.

Lymph Glands	Lemon and Doyle	Desjardines and Ford
Cervical	100	96.3
Supraclavicular	88	
Axillary	50	59.4
Inguinal	42	36.5
Abdominal ...	19	11.8
Mediastinal ...		33.3

The source of "primary" enlargement may be superficial or deep. Symmers (1924) maintains that primary abdominal enlargement is ten times more common than primary enlargement of the cervical glands, and as frequently involved as the cervical. In four of his cases the latter were not involved at all. This may explain the hyper-acute cases he states. His figures, 1924 series—Cervical, 7 per cent; Abdominal, 28 per cent.; Chest and Abdomen, 43 per cent.; Thymus, 1 case; Nodes of Neck not involved at all in 28 per cent.

Preponderant and even sole enlargement of the lymph glands may be confined to one group or groups, mediastinal, spleen, etc.

Intra-Thoracic form of Glandular Enlargement.—The chief lesion in a case of Hodgkin's disease, with or without palpable glands, may be mediastinal glandular enlargement. Rolleston says it is primary more often than is recognized. It forms a bulky tumour often compressing bronchial vessels and nerves with corresponding pressure symptoms, e.g. cough, dyspnoea. The bronchial glands may be first affected and travelling along the bronchi as a solid growth or as radiating bands following the inter-lobular lymphatics, acute pleurisy being the first clinical manifestation. (Simonds). Pleural effusion results in 20 per cent of cases (Ziegler). Pleural involvement has been observed. Symmers reports such a case in which empyema developed. The thymus gland may be early attacked in the generalized involvement. Symmers reports five cases involving the thymus alone, two of his own and three by other observers. This he endeavours to establish as an entity. The histological changes are in complete agreement with the histology of Hodgkin's disease he claims, and finds encouragement for his contention in that four independent observers described the cases. But Ewing has shown that one group of lymphosarcoma or thymoma of the thymus, resembles Hodgkin's disease. This probably explains Symmers' "entity."

The heart and pericardium are not usually involved, but hydro or haemorrhagic pericardium may arise and granulomatous nodules be found in the pericardium.

Abdominal Hodgkin's Disease.

The lesion may begin in the retroperitoneal or mesenteric lymph nodes and enlarging produce a bulky tumour. Symptoms arising from pressure such as oedema of the extremities, serous or chylous ascites, constipation and pain may arise. Involvement of the glands about the bile ducts give rise to jaundice. A mass about or involvement of the adrenals is corelated to cutaneous pigmentation (Rolleston). Enlargement of the superficial glands may occur prior to or concomitant with abdominal glandular involvement or not at all. The ascites or other abdominal symptoms may be the first indication of the disease and cholecystitis or hepatic abscess may be simulated by enlargement of glands near the liver.

The spleen is involved in 65 per cent. of cases (Symmers). Primary splenic involvement has been reported (Mellon, Ewing, Symmers). It is involved with superficial glandular enlargement and rarely escapes if the retroperitoneal glands are involved. In some cases it is very slightly affected, in others extensive necrosis with fibrous tissue replacement occurs, the pulp being infiltrated by the typical cells as well. It may attain a large size, but not so large as in myeloid leukemia. The surface frequently shows grey elevated, sharply circumscribed nodules composed of the characteristic tissue

distinctly marked off from the dark red pulp (MacCallum, Simonds).

The liver is affected in more than 50 per cent. of cases viewed at autopsy (Rolleston; 71 per cent. (Symmers). It is, however, never exclusively invaded. Ziegler states it is enlarged in 60 per cent. of cases. The surface is sometimes roughened by nodular elevations. These nodules are found on section to occupy the periportal tissue and sometimes to replace the parenchyma. Symmers (1924) cites a case where massive enlargement of the liver was the predominant feature in the case. On autopsy, two thirds of the parenchyma was found to be replaced by the lymphogranulomatous process. The extensive sclerotic changes in the walls of the portal veins, as illustrated in this case, he believes to constitute a new phase in the pathology of Hodgkin's disease.

The kidneys often show granulomatous deposits in the cortex and almost always when in association with Hodgkin's disease of the retroperitoneal lymph glands (Simonds). Occasionally the peri-renal lymphatic glands are much enlarged. The kidneys may be cystic. Albuminuria is the only clinical manifestation that has been corelated to renal involvement by the lymphogranulomatous process.

The adrenals are not frequently involved. Ziegler knows of no case in the literature. Bine, however, reports a case in which one of the adrenals, in a case of Hodgkin's disease, was involved by a large lymphogranulomatous mass. Rolleston suggests pressure on them by adjacent enlarged glands, may result in pigmentation of the skin.

The pancreatic lymph nodes are frequently involved in the lymphogranulowatous process of Hodgkin's disease with the other abdominal lymph nodes.

Gastro-intestinal lymphogranulomatosis is not of as frequent occurrence as formerly believed. It has become important because of the many failures to recognize it whether during life or from its gross anatomic features. Rolleston (1925) reports that Turnbull found only one case in 47 necropsies. But more are being reported in the literature constantly, as such. According to Hayden and Apfelbach, gastro-intestinal Hodgkin's disease has been described in the literature, but not recognized, being confounded with lymphosarcoma, carcinoma, tuberculosis and pseudoleukemia. These workers, in a recent study of 26 cases, collected from the literature and three new cases described, put this aspect of Hodgkin's disease on a sound and recognized basis. In this series of theirs, there are instances in which a single tumour of the bowel constitutes the only lesion, others with large and multiple ulcers of the gastro-intestinal tract. In some instances only was enlargement of glands or group of glands associated and in one case only were the superficial glands enlarged. Extensive infiltration of the spleen and liver was exceptional, though infiltration of the mesenteric glands occurred more frequently. The symptoms were in most cases purely gastro-intestinal. The pathology of Hodgkin's disease of the gastro-intestinal tract presents the same microscopic picture as elsewhere, including the Sternberg-Reed giant cells. Occasionally the changes in the mesenteric glands or intestines or stomach shows merely a hyperplasia, but one or other always shows the typical histopathologic characteristics. The most common gross lesions are multiple, small, grey, translucent infiltrations of the mucosa and ulcers of the stomach and bowel in order of frequency from the stomach to the rectum. The larger ulcers are irregular in shape with elevated edges. Absence of tubercles in the base of the ulcer, which is clean or covered by smeary, sticky material, distinguishes it from tuberculosis.

Cutaneous manifestations occurring in Hodgkin's disease are variously estimated at 25% of cases (Ziegler) to 39% (Cole). Ziegler states that in 5 to 12% of cases some cutaneous manifestation occurs before any other. Bine cites such a case. These manifestations vary from pruritic eruptions possibly

of toxic origin to actual lymphogranulomatous nodules in the corium. Pigmentation occurs and may be due to irritation of the sympathetic or pressure on the adrenals (Rolleston). Arsenic and X-ray treatment may, however, explain it. Pruritis may or may not be accompanied by an eosinophilia. Increase of subcutaneous connective tissue may be corelated to the pruitis. Lymphogranulomatous nodules in the skin are uncommon. Rolleston could only find 12 such cases in the literature. These lesions range from pin head size to large, flat plaques. The face and scalp are most commonly affected. Prurigo, itchy papules, consisting of inflammatory round cell infiltration about the sweat glands, occur. Bullae, erythema, urticaria and purpura are among the associated skin conditions.

Lesions of the mucous membrane are extremely rare. Bine reports such a case involving the roof of the mouth and eventually eroding the palate.

Muscle tissue becomes invaded during the course of Hodgkin's disease at times (Simonds). Symmers reports such a case where extension of lymphogranulomatosis of the mediastinal lymph nodes resulted in extensive infiltration of the inter-costal and pertoral muscles. In this instance the previously related views of Ewing on mediastinal Hodgkin's must be borne in mind.

Skeletal invasion occurred in 7 of 14 cases (Symmers). Turnbull at the London Hospital, says it is found in 19% of cases of Hodgkin's disease. The femur and lumbar vertebrae are most commonly affected. Turnbull, from his studies, believes the former is affected hematogenously and the latter by direct extension from the retroperitoneal glands. Hodgkin's disease of bone may take the form of a granulomatous periostitis, some workers believe. (Steiger, Weber quoted by Simonds). Rarefaction and spontaneous fracture may occur (Bitzke). Ziegler states that the bones are involved in 30 to 40% of cases.

The bone marrow, Symmers claims to be involved in all cases of Hodgkin's disease, Hammar suggests that it becomes involved before the lymph glands. Symmers speaks of three chief changes in the marrow: (1) An overgrowth of connective tissue with obliteration of the marrow cavities; (2) Histologic changes as in the lymph glands; (3) Hyperplastic changes as in marrow, especially in myelocytes and non-granular cells, plus large, round, nuclear and myeloid giant cells. Morphologically, identical cells were found in one case in liver and in another in lungs and tonsils. Cone, in a detailed report of sections of bone from two cases, where diagnosis of Hodgkin's disease was established at autopsy, speaks of Dorothy Reed giant cells in the marrow. In addition there is fibrosis and a coagulation necrosis. The outstanding change, he says in summarizing is the progressive change in tissue formation (fibrous), but the greater implications of the reticulo endothelial system and Reed giant cells, is more a Hodgkin's disease involvement. Paraplegia occurs very occasionally due to pressure on the cord by lymphogranulomatous growth, which has gained access by an infiltrated vertebra. Wilbur reports five such cases. Carslaw and Young report a similar case. The paraplegia in this instance was due to invasion of the vertebra and dura mater with a tendency to invade it. Degeneration of the posterior columns resulted. In addition the anterior and posterior nerve roots were embraced by the new-formed tissue with consequent degenerative phenomena in their fibres. The brain, thyroid gland, ovaries, uterus, testicles, ureters, bladder and tonsils are rarely involved, but such cases have been reported.

Clinical Manifestations.

In spite of the classical descriptions of Hodgkin's disease as a progressive glandular enlargement starting in the cervical region associated with an increasing degree of anemia, irregular fever and fatal termination, the diag-

nosis is not easy. This, for the simple reason that the above only epitomizes a fraction of the cases of Hodgkin's disease. It is becoming increasingly well recognized that Hodgkin's disease may start with abdominal or intra-thoracic glandular enlargement, indeed in a large percentage of cases. Hayden and Apfelbach have recently collected a series of cases drawing attention to the fact that the disease may begin by involving the gastro-intestinal tract and largely remain confined there still running to a fatal ending. Many atypical forms have been described in which, for example, pleural effusion may be the first sign. Again the disease may be confined solely, or almost so, to the spleen in co-called primary Hodgkin's disease of the spleen. Pruritis may herald the onset of the affection or accompany it. Such a variety of types produce a multitude of symptoms and no one picture can be drawn that will include all phases. These three facts stand and may act as a frame-work for diverse adnornment, namely, that Hodgkin's disease is always "marked by progressive glandular enlargement, anemia and fatal termination. The first part of that statement must be qualified by adding that the enlargement is not always externally appreciable."

The duration of the disease is hard to estimate, since there is no means of knowing when the condition started. Patients usually live three years after consulting a doctor on account of symptoms, though an acute form is recognized in which death may occur in a month or two. In these cases the glands often swell quickly and present a red, brawny skin surface overlying them.

Symptoms in the majority of cases are pressure phenomena, though frequently come first complaining of a mass in the abdomen, which turns out to be the spleen, or asthenia. Intra-thoracic pressure symptoms are cough and dyspnoea. Intra-adbominal pressure symptoms are oedema of the extremities, ascites, jaundice and constipation. Diarrhoea is a common accompaniment of the gastro-intestinal type. The anemia becomes marked as the disease progresses and lassitude and loss of weight become more noticeable. Fever may occur at any time during the course of the disease, irregularity or relapsing in character. This type to which Murchison first attracted attention and better known as the Pel-Ebstein type of fever, is marked by a sudden rise of temperature after a period of low pyrexia. In the space of three or four days this may rise as high as 105°, remain thereabouts for a few days and then fall by lysis to the former low level. After an afebrile period of a week or ten days, another bout of fever reoccurs. During these attacks the glands may swell greatly and become tender.

A peculiar disappearance of the glandular swelling has been noticed to occur during an inter-current infection such as erysipelas or pneumonia, but subsequently the swelling re-appears.

The termination of Hodgkin's disease comes as a result of cachexia, pressure effects, acute miliary tuberculosis or inter-current disease.

The Blood in Hodgkin's Disease.

The blood in Hodgkin's disease early shows a secondary anemia, which becomes more marked as the disease progresses. The general conclusion is that there is no single blood picture, though an early lymphocytosis without a rise in the total count, may occur according to Bunting. This increase includes a marked rise in the per cent. of transitional cells, he believes, and a decrease in the eosinophiles. In further advanced and more generalized cases, he encounters a slight leucocytosis with a polynucleosis of 75 to 90 per cent. Fraenkel and Much, Weiss and Fabian emphasize this latter occurrence. Over 46% of the cases of Desjardines and Ford had a white cell count over 11,000. Bunting further points out that the platelets are increased. In absence of suppuration in well-advanced cases, Bunting presents the following blood

picture as pathognomonic. Leucocytes 20,000, lymphocytes 5% or less, polymorphonuclear neutrophiles 80% or more, transitionals more than lymphocytes, eosinophiles and basophiles almost absent. Leukopoenia occurs in Hodgkin's disease in one-fifth of all cases (Fabian). At the Montefiore Hospital in 18 cases only one showed a leukopoenia. Miller, in a review of six such cases from the literature advances as explanation, aplasia, toxaemia, effects of Roetgen-ray and bacteremia.

Diagnosis.

This must include other forms of glandular enlargement such as Tuberculosis, leukemia, chronic inflammation, lymphosarcoma and other pyrexic states. The diagnosis from tuberculous lymphadenitis rests on the fact that lymph nodes in Hodgkin's disease tend to remain discrete and do not supperate, a tuberculin test may help. The inflammatory lymphadenitis can often be related to a focus of infection, does not show the tendency to massive or generalized enlargement. Leukemia can be differentiated by the blood picture almost always. Lymphosarcoma clinically may resemble Hodgkin's disease. In any case, biopsy may have to be resorted to for recognizing Hodgkin's disease. In the early hyperplastic state the disease may not be recognizable and this must be borne in mind. In addition to the above, Hodgkin's disease may have to be differentiated from pulmonary tuberculosis. Lawrason Brown points out that this is difficult at times. Richards claims that mediastinal Hodgkin's disease is frequently diagnosticable by X-ray. In the splenic type other forms of spenomegaly will have to be excluded. In the gastro-intestinal type diagnosis is very involved and should include peptic ulcer and carcinoma in the differentiation.

Treatment.

No form of treatment is successful. All cases are fatal. Arsenic and vaccines are of little use. Irradiation is of doubtful value, though it alleviates the symptoms, decreases the size of the glands for a time, but does not influence the duration of the disease according to Minot and Isaacs. In this, Richards does not agree.

Summary and Conclusion.

Hodgkin's disease in the sense the term is used in this paper, is a histopathological entity. The disease must not be regarded merely as a clinical syndrome, namely, a marked chronic enlargement of the lymph nodes of the neck, but as a disease of widespread involvement of the lymphoid tissues of the body. The mediastinal type in its invasive and microscopic characteristics, strongly suggests transformation to a sarcoma. Recognition of a type localized or chiefly involving the gastro-intestinal tract, is becoming more frequent and should be considered in any obscure abdominal disease. Ewing epitomizes the question of the genesis of Hodgkin's disease and comments sensibly on the problem. He says he is impressed by the "utter obscurity as to the origin and clinical significance" of Hodgkin's disease and "the prime necessity at the present moment of maintaining clear distinctions between the different forms until we know more about the origin."

The blood in a certain per cent. of cases of Hodgkin's disease shows a characteristic picture. Diagnosis is difficult in view of the multiplicity of the types and manifestations of the disease. Treatment by radiation alone is of any value, and that but palliative.

Primary Carcinoma of the Lung—A Review.

(By T. G. Heaton, M.B., Mountain Sanatorium, Hamilton, Ont.)

Primary carcinoma of the lung is being diagnosed with increasing frequency and early diagnosis is being encouraged by the progress of intrathoracic surgery with its hope of curing the previously incurable, so that a review of the subject is timely.

Etiology.

Several factors are mentioned as possibly predisposing to cancer of the lung.

(a) *Tuberculosis.* Several authors mention that active tuberculosis is frequently found in the cancerous lung. Ewing states that carcinoma may develop in the wall of a tuberculous cavity.

(b) *Chronic bronchitis.* "A history of chronic bronchitis has often preceded bronchial carcinoma and lesions of chronic bronchitis often present very marked overgrowth of bronchial epithelium." (Ewing).

(c) *Trauma* may be a rare factor.

(d) *Anthracosis.* In many carcinomatous lungs anthracosis may be extremely marked.

(e) *Influenza.* The frequency with which a history of influenza is obtained in these cases and the increase in the incidence of cancer of the lung since the influenza epidemic years, have suggested to some a relationship between influenza and primary carcinoma of the lung.

Incidence.

Primary carcinoma of lung was found in 1% of 16,578 cancer autopsies.—(Ewing).

It is considerably more frequent in males. The figures given by Ewing are: Males, 71.9%; Females, 24.8%.

It is more frequently found in the right than in the left lung.

The age incidence in Adler's series was as follows:

Age.	No. of cases.
10-20	6
20-30	10
30-40	30
40-50	78
50-60	113
60-70	94
70-80	23
80-90	2
Total	356

Pathology.

The pathological types are:

(a) *Carinoma of epithelium lining bronchi.* This seldom produces a diffuse tumor of lung. It usually begins at or just below the bifurcation of the trachea and forms papillomatous masses in the larger bronchi. Stenosis of the bronchus is therefore usual. Its microscopic structure consists of masses of cylindrical cells with greater or less tendency to alveolar arrangement and often metaplasia in areas to the squamous cell type.

(b) *Carcinoma arising in bronchial mucous glands.* This tumor is recognized microscopically by the presence of mucus in the cells or in cystic spaces between them and if sufficient mucus is present the diagnosis may be fairly evident in the gross.

(c) *Carcinoma arising from pulmonary epithelium.* Two forms are described:

i. Diffuse — perhaps involving with its inflammatory reaction an entire lobe and giving the signs of lobar pneumonia.

ii. Multiple nodules.

Pathological Sequelae.

Pathological sequelae of carcinoma of the lung may be readily inferred, and will merely be enumerated. The clinical signs and symptoms of carcinoma of the lung are largely due to these sequelae.

(a) *Stenosis and complete obstruction.*
Atelectasis of lung distal to obstruction.
Elevation of diaphragm.
Compensatory emphysema.
Asymmetry of chest.
Displacement of heart.
Bronchiectasis distal to obstruction.

(b) *Secondary inflammatory reactions.*
Pneumonia—acute or chronic.
Lung abscess.
Fibrosis of lung.
Gangrene of lung.
Bronchitis—cough and sputum.

(c) *Extension to pleura.*
Pleural effusion which may be clear at first, but always becomes haemorrhagic and tends to recur.

(d) *Erosion of a blood vessel.*
Haemorrhage.

(e) *Metastases.*

In Adler's series the six most frequent sites of metastasis were in order of frequency: bronchial nodes, liver, kidney, brain, various bones, and pleura. Metastases occurred in all parts of the body.

In 33 of his 374 cases no metases occurred and in two of these cases the symptoms were of two years' duration.

Metastatic masses in the mediastinum may lead to obstruction of the great veins with consequent oedema, or to erosion of the vessels, or obstruction or erosion of the oesophagus with dysphagia or fistula and there may be involvement of the recurrent laryngeal nerves.

(f) *Degeneration of tumor.*
Cavity formation.

Clinical Types.

The clinical types are well recognized.

(a) Carcinoma *accidentally discovered* at autopsy.

(b) Sudden death from *haemoptysis.*

(c) *Acute form* with cough, dyspnœa, asphyxia, and death in a few weeks. The pathological basis of this form is a carcinomatosis of the lungs with gross and X-ray appearance something like miliary tuberculosis or silicosis. This form is rare.

(d) *Chronic form.* This is the usual type, and it shows great variations in its clinical course according to the pathological condition present. The most usual type is that characterized by cough and sputum, with increasing dyspnoea, a variable amount of cachexia and often haemoptysis and a sense of pressure or pain in the chest. Pleural symptoms may dominate the picture with much pain and recurring effusions, or symptoms referable to a mediastinal mass may be prominent.

Discussion of Symptoms.

(a) *Pain*—is frequent in carcinoma of lung, and usually means pleural invasion. There is often a sense of discomfort or pressure in the chest, and it is stated that the pain may be referred to the healthy side.

(b) *Cough*—is usually an early symptom, and is often without sputum, at least for a time. Bronchitis, and bronchieatasis are, however, common complications.

(c) *Sputum*—a supposedly typical sputum is described as "raspberry jelly" or "prune juice." This is now known to be neither typical nor usual, but is suggestive when found. A very

green sputum, "grass green," is also described (Adler). Bloody sputum, a frank haemoptysis, is usual at some time or other, and haemoptysis is a common cause of death. Haemoptysis in a case of cancer of the lung is more likely to be fatal than in pulmonary tuberculosis.

(d) *Respiratory difficulties* may be the first symptom and are usual at some time during the disease.

(e) *Cachexia* is frequent, but quite irregular, and obesity has been recorded not rarely as in one case seen by the writer where the subcutaneous fat of the abdominal wall measured about 2 inches in thickness.

(f) *Fever.* The presence of fever depends on the inflammatory complications present.

(g) *Difference in pulse* in two wrists may be noted if there is a mediastinal mass.

Diagnosis.

(a) *History.* Suggestive histories are those of pneumonia which fails to clear up or repeated haemoptysis without fever or adequate cause, or recurrent bloody pleural effusion.

(b) *Physical examination.* A consideration of the pathology shows that there is no symptom or physical sign characteristic of cancer of the lung. The combinations in which these occur may, however, be suggestive. That is, the diagnosis may be made from the *course* of the disease. For example the sudden occurrence of atelectasis of a lobe with dullness on percussion and absent breath sounds and no effusion. Or the sudden clearing up of dullness when the tumor degeneration admits air to a collapsed lobe or the combination of a chest lesion with findings elsewhere which might be due to a metastasis, e.g., hemiplegia.

(c) *Clinical laboratory.* Adler reports in the sputum of every case of primary carcinoma of the lung "large spherical cells filled with fatty granules and associated with abundance of epithelial cells which are strangely deformed and possess club-like and tail-like projections." So far as the writer knows this has neither been confirmed nor denied. The cells are looked for in fresh *unstained* sputum. The blood shows a leukocytosis of varying degree with polymorphs relatively increased.

(d) *X-ray.* This offers probably the best means of diagnosis.

The types of X-ray picture given by a primary carcinoma of the lungs are:

1. Like lobar pneumonia—often with elevation of the diaphragm (growth with surrounding pneumonia or atelectasis). Common.
2. Conical shadow with base in hilus, striations radiating from this. (Carcinoma cells in lymphatics). Less common.
3. Nodular type. Large unilateral nodules with dense streak of shadow leading from each to hilus. Rare.
4. Cavernous type. A huge solitary cavity in one lung.
5. Metastatic tumors of the lung are round, sharply outlined nodules and are usually easily distinguished. Echinococcus and other cysts are also rounded and sharply defined.

(e) *Artificial pneumothorax* may be used to locate an intrathoracic tumor as definitely intrapulmonary, an X-ray being taken when the pneumothorax has been accomplished.

(f) *Thoroscopy* has been used to explore the chest pre-operatively.

(g) *Lipiodal injection* may demonstrate bronchostenosis or the relation of the growth to a cavity.

(h) *Bronchoscopy* is capable of settling the diagnosis in many cases of bronchogenic carcinoma.

(i) *Oesophagoscopy* has been used when indicated, and a barium drink may be useful in some cases.

(j) *Aspiration of the lung* with a large bore needle to secure tissue for examination has been advocated and condemned. It is not universally advised, some urging the danger of haemorrhage.

(k) *Exploratory thorocotomy* has been performed in a few cases as one would do a laparotomy, and probably with no more danger or less justification. It permits inspection of the lung and even removal of a portion of the growth for section.

Prognosis.

The duration of the disease from the onset of the symptom varies all the way from death from the first haemorrhage to 6 years, as in the case seen by the writer at the Mountain Sanatorium, Hamilton. The average duration seems to be from 1 to 2 years.

Treatment.

Radiation is not particularly successful, but should probably be tried.

Surgery offers some hope. Edwards lists the intrathoracic tumors which he claims are removable by operation:

1. Intrathoracic growths of the chest wall.
2. Teratomata (which are usually outside pleura or pericardium).
3. Tumors of pleura.
4. Alveolar tumors of lung (not attached to large bronchi).
5. Cysts.

He reports lobectomy on one patient, a man of 60, which was accomplished without excessive shock, but the patient unfortunately died 9 hours later of secondary haemorrhage from an intercostal vessel.

Thoracic surgery looks promising.

Some Diagnostic Aphorisms.

As conclusion the following are respectfully submitted.

1. Rapid changes in the physical signs in the chest may mean tumour.
2. The presence of tubercle bacilli in the sputum is not against the presence of cancer of the lung. The two conditions are often associated.
3. Beware of unresolved pneumonia in the cancer age.
4. Pleural effusion which is at first clear and becomes haemorrhagic, is probably due to cancer. If it is haemorrhagic at first and becomes clear it is more likely tuberculous.
5. A large solitary cavity in the lung without other lesion elsewhere is probably a tumor.
6. In any case of repeated severe haemoptysis suspect new growth.
7. If aspiration of a pleural effusion does not relieve symptoms, and if the displaced heart does not come back when the fluid is removed, suspect new growth.

References.

Ewing—Neoplastic Diseases.

Adler—Primary Malignant Growths of Lungs and Bronchi.

Kerley—Neoplasms of Lungs and Bronchi, British Journal of Radiology XXX. p. 333, Sept., 1925.

Ballon—Primary Carcinoma of Bronchus and Abscess of Lung Diagnosed Bronchoscopically and Injected with Lipiodol. Medical Journal and Record, CXXV., 4, p. 225, Feb. 16, 1927.

Edwards---Intrathoracic New Growths, an account of seven operable cases. British Journal of Surgery, Vol. 14, No. 56, p. 607, April, 1927.

LeWald—New Growths of Lung, primary and secondary, Radiology, Vol. 4, No. 3, p. 222, March, 1925.

Polyhydramnion.

By Chas. W. Service, B.A., M.D., Chengtu, West China.

This condition is also called Hydramnion and Hydramnios. It is the opposite of Oligohydramnion, the term used when the liquor amnii is very scant. These conditions are generally classed under the general head of Anomalies of the Placenta and Membranes. There are several of these, one of the most important of which is the one now considered.

Polyhydramnion denotes an increase in the amount of liquor amnii beyond normal limits. Normally the amount varies between 1,000 and 2,000 c.c's. Certainly any amount over 2,000 c.c's (about three and a half pints) must be regarded as excessive. Several pints are quite common, but there may be fifteen or more pints. As a rule the increase is gradual, but occasionally it is very rapid and the condition is then called Acute Polyhydramnion.

As for the *pathology* and *etiology* of this interesting condition, it is impossible to be dogmatic. Several explanations have been given, but for a detailed discussion of this phase of the subject the reader is referred to some good text-book on Obstetrics. Suffice it to say that the condition is very often associated with one or more other conditions, such as uniovular twins, fetal abnormalities and obstruction of the fetal circulation in the cord or within the fetus.

Symptoms and *signs* generally begin about the fifth month of gestation and are mainly due to mechanical causes, namely, pressure of the large uterus on contiguous structures, causing palpitation, dyspnoea, cyanosis, varicosities, cedema, abdominal pain, etc. But it is to be noted that gradual accumulations of even large amounts of fluid may cause little discomfort. It is the occasional acute form which collects within a few days or a week or two that produces severe symptoms.

In *the acute form*, in addition to the above mentioned signs and symptoms, there are often seen flatulent dyspepsia, vomiting, constipation and a rapid pulse. The abdomen is very tense and quite tender and a fluid thrill can generally be obtained. Fetal parts cannot be felt. External ballottement is only very occasionally present, depending on the amount of fluid and the size of the fetus or fetuses. The fetal heart can rarely or never be heard. In *the chronic* or gradually developing type the abdomen is uniformly distended, but is not tender. The skin is shiny and tense, with large lineae albicantes.

As a rule *diagnosis* is not very difficult. There are always some signs of pregnancy, and the size of the uterus is larger than normal for the supposed date of pregnancy.

The following are the chief conditions to be differentiated:

1. An *Ovarian Cyst*, especially if unilocular. Here there is certainly no ballottement, fetal heart or uterine souffle. On vaginal examination the cervix is found to be closed and hard, while it is open and soft in polyhydramion. The uterus can generally be felt to be apart from the tumor and usually lies below it. If an ovarian cyst complicates pregnancy there is usually great difficulty in diagnosis, and in such cases the exact area of fluid thrill should be carefully determined.

2. *Simple Twin Pregnancy.* Diagnosis may not be difficult unless the fluid is very excessive, or unless the fetuses are small, in which case fetal parts cannot be felt, nor can two fetal hearts be heard. Multiple pregnancy may go unnoticed. In simple twin pregnancy vaginal examination will generally palpate an engaging fetal head which lacks the mobility of a fetus floating in an excess of fluid.

3. *Ascites* shows tympany around the umbilicus with shifting dullness by alteration of the position of the patient.

4. *Vesicular Mole* shows rapid development of the uterus which suggests rapid and undue accumulation of liquor amnii. But development is always slower than is the case with Acute Polyhydramnion. Moreover, there is no thrill, no ballottement, no fetal heart. The patient's general condition is usually poor, showing anemia, emaciation, malaise. Moreover, there is usually a bloody discharge which may or may not contain vesicles. The cervix is dilated and the lower segment of the uterus contains blood and vesicles of the characteristic type. The uterus generally feels doughy.

Regarding *prognosis*, the fetal mortality is about 25% in chronic cases, but is much greater in acute cases. Prematurity and fetal abnormalities and monstrosities are common. The fetus may die of intra-uterine asphyxia, prolapse of the cord, malpresentations, etc. In the acute form abortion generally occurs. The chief dangers to the mother are over-distension of the uterus, uterine inertia, abruption of the placenta and post partum haemorrhage.

The majority of cases are mild and therefore require no active *treatment*. The patient may require rest and she should be carefully watched.

In acute cases pregnancy should be terminated by rupture of the membranes. It is quite permissible to pass the sound in critical cases for diagnostic purposes. The water should be let off slowly by passing a small trocar or a sound. Sometimes after passing a sound there may be almost no fluid, due to the fact that there are twin sacs of which the smaller lies over the os uteri. In that case the first child is born without diminution in the size of the uterus. Therefore the large upper sac must be ruptured. Owing to uterine interia there is danger of post partum haemorrhage for which preparation must be made. It may be necessary to remove the placenta quickly, to pack the uterus and the vagina and to give pituitrin.

The following is a brief record of a case of Acute Polyhydramnion occuring in the practice of Dr. Ada Speers in Chengtu, West China, in which I was called in consultation. Dr. Speers conducted the delivery. The patient arrived at the hospital in labor and therefore did not require induction. For this reason also our history and other records of the case are rather brief and scrappy. But the case is of sufficient interest to warrant description.

Case.

The patient was a Chinese woman, aged 23, married ten years. This woman illustrates how very young many Chinese girls are married. This was her sixth pregnancy. Two children were living, two dead and she had had one miscarriage at the sixth month. She said that all of her labors had lasted three or four days, and that she had what she considered an excess of fluid with each birth, whether full term or not. With her first two labors she had severe haemorrhages immediately following the birth of the child.

On admission she complained of extreme swelling and distension of the abdomen; also pain in the abdomen for the past five days, but especially during the last three days.

She was evidently in labor and Polyhydramnion was suspected. She said she was six months pregnant, but her abdomen was of enormous size.

There was nothing very noteworthy about her menstrual history except that the interval varied from fifteen to forty days. Her last period was six months before admission.

She complained of a constant, profuse, white intermenstrual discharge. Her husband had had gonorrhoea and probably also had tuberculosis. She herself had had hemoptysis seven years previously. Her bowels moved at intervals of three or four days. Otherwise she said her health was good.

Present Illness. Patient said she was six months pregnant. The extreme swelling and distension of the abdomen had increased very rapidly during the past five days. Pain in the abdomen was especially severe during the past three days. For the first few days the

pain was confined to the upper abdominal zone, but for the past few days it was chiefly located in the lower abdomen. Her discomfort had increased daily for several days, as had also the oedema of both legs. She was unable to sleep for the past eight or nine nights, and she had had no bowel movement for six or seven days, and for several days she had a slight cough. Up to these recent events she had felt in fine condition.

Examination showed a well developed woman, with a normal temperature, a pulse of 108 and respiration 26.

The abdomen was tensely distended, with bulging flanks, and superficial veins were evident. There was dulness anteriorly and on both sides, extending up to the ribs and almost to the ensiform cartilage. There was a small area of tympany posteriorly on both sides. The uterus could not be outlined. Fetal parts could not be felt, nor could fetal heart sounds be heard. There was also a fluid thrill. There was no ballottement externally. The legs were quite oedematous and stiff—all occurring during the past few days.

Vaginal examination on admission revealed the Os open a little more than two fingers, with considerable rigidity of the cervix. A small fetal head was easily palpable, but there was little indication of a bag of waters. The head seemed to rest right on the finger, and was not very movable, probably because it was in a very small sac with little fluid, with a very large tense sac above it.

The labor proceeded for several hours and then the child was born, a still-born boy weighing one pound, one ounce. Evidently he could not account for the great distension, especially as almost no amniotic fluid came with him or before him. There was not the least perceptible sign of any diminution in the size and tension of the abdomen.

Another vaginal examination was made and the Os was found well dilated. a tense sac was felt and there was internal ballottement obtainable. The sac was ruptured and a very large amount of fluid came away and a second still-born boy was born who weighed one pound six ounces. This also was an occiput presentation. The abdomen quickly receded and the uterus could now be easily felt. The uterus promptly contracted and there was no more than normal bleeding. The fluid weighed 16 pounds.

Twenty minutes after the birth of the second child the placenta and membranes were born intact. There was one placenta with two distinct sacs and two cords. The placenta was large in area but not thick, and weighed just one pound. The cord of the first child was short, stenuous and easily broken, while that of the second was larger and stronger.

With the exception of the rupture of the second sac, the labor was not assisted in any way, nor were there any lacerations, bleeding, or any other complication.

The puerperium immediately followed labor was without accident. The lochia was normal and by the fifth day was scanty and of a light red color. The height of the fundus gradually lowered until on the sixth day it was four inches above the symphysis pubis. Two days after labor the patient appeared as happy and as comfortable as though nothing unusual had happened. The oedema of the legs gradually disappeared. On the morning of the seventh day she insisted on leaving the hospital and was dismissed as "cured."

Diagnosis after Labor: Twin pregnancy, Miscarriage at sixth month (or a little earlier) and Acute Polyhydramnion of one amniotic sac.

Diagnosis of the Early Luetic Lesions.

By Chas. H. Hair, Genito-Urinary Department, Toronto General Hospital.

Advances in medical diagnosis must have a scientific basis. For centuries the diagnosis of Lues in its varied forms with their devastating effects on the human race made no progress. Treatment of this disease remained the same since the days of Hunter, and empirically the therapeutic effect of Potassium Iodide and Mercury often became the diagnostic evidence of the disease.

About 1905 the organism causing Lues and known as the Spirochaeta Pallida was discovered by Chaudinn, and in 1906 the Wassermann test was brought out. Shortly after these discoveries in 1909, Ehrlich gave to the world the first Arsenical preparation known as "606," and a greater scientific interest in this malady was at once awakened. Again within a short time the Wassermann test became the diagnostic standard with the result that the disease began to be studied from a clinical and pathological standpoint. These studies soon brought out the fact that many of the cases treated according to the standards then considered necessary for a cure—were latent only, and the disease was likely to reappear in some one of its many phases. Laboratory tests and Pathology have now shown that the three stages as described are not limitations of time, but are only different progressive manifestations of the infection. Therefore the pathology of the primary lesion is locally the same pathology that occurs in later years and shows us we are dealing early with a general systemic infection and reasonably then, if we hope for success in the treatment of this disease, the diagnosis must be made early.

Now, when we look for the reasons why so many cases come for treatment in the late stages of the disease we are faced with these facts. First of all, the mental attitude of the public is that Lues has a something about it so horribly diagnostic that they feel secure in not having these evidences. In other words the early lesions may be so insignificant to them that they are not thought serious. But, secondly, perhaps the greatest danger in early diagnosis is the too prevalent idea the profession has that Lues only begins as a local infection so classically described by Hunter and known as a "Hunterian Chancre," hence other genito-urinary conditions even more prevalent are overlooked. Two clinical facts have stood out as a criterion of diagnosis; first the time appearance of the lesion, and secondly the clinical appearance. Both of these facts are only important positively, and not important negatively. In other words, while the appearance of a lesion exposure is likely to be luetic, yet such a lesion at, say ten days, may also be luetic. Hence the clinical appearance also varies. When we appreciate that through any sore, pimple, ulcer or inflammatory condition, the Spirochaeta - Pallida can gain an entrance into the tissues, and thus begin its anaerobic development, then we are in the position that we must prove its absence in any of these lesions by a dark field examination or later prove its absence by a negative blood from repeated Wassermann tests. Besides the definite ulcer or sore of an early lesion no doubt many patients become infected by such common genito urinary diseases as urethral or vaginal discharges, and Balanitis—as well as by the extragenital sore which usually occurs around the buccal cavity. These conditions undoubtedly explain the great number of cases that come to our clinics with no positive history of the early infection and are very often deserving of considerable pity. One also ought to mention here the cases who, in the absence of any early symptoms, have contracted the disease by pregnancy. Before the days of the Wassermann test these cases gave us the old adage,

"When in doubt give KI," but now even with repeated Wassermann tests, how hard it is to convince these patients that they have a general blood infection. Only within recent years have we had the necessary type of Microscope to make the examination for the Spirochaeta Pallida easily and accurately done. To-day, however, the Dark Field examination is a most accurate method of demonstrating the organism in these earlier lesions. It consists of light refracted through a microscope equipped with a dark field condenser.

The method of examination is as follows: A drop of serum or secretion is obtained from the sore and placed between a coverslip and a slide not previously used or scratched. The coverslip is then pressed firmly down on the slide. A drop of oil is placed on the condenser and this connects the condenser with the lower side of slide; then a second drop of oil is placed on the coverslip and the oil immersion lens used. When focussed the field shows Brownian movement and in this field the Spirochaeta Pallida is found as an active motile, translucent organism. It consists of eight to twelve perfect spirals — the organism being from four to fourteen m.m. in length and about one-quarter to one half m.m. in width. From its rapid rotating motion it possesses active propelling action and will rapidly cross the microscopic field. When halted in its propelling movements it will still keep rotating and may be seen breaking in the centre with what is known as an "elbow" movement. I know of no organism that can awaken more interest in watching its movements than this one under the microscope as its motions are definite and characteristic.

In concluding this plea for the early diagnosis of this great plague, I am convinced, after watching the results of treatment of these unfortunate cases for more than ten years in our clinic, that, in what is called the Primary State of the disease, our results are so much better than in the next stage or late cases that there can only be one conclusion, early and intensive treatment.

Faculty Notes.

"The Student Organization for Interne Pay."

During the present session an organization sprang up in the undergraduate body in Medicine of our school. The purpose of this organization is to obtain salaries for recent graduates during their terms of internship in the larger hospitals. Not only was every student in the school approached and invited to support the plan and join the organization, but the promoters of the scheme sounded out the student bodies of many other large medical schools in Canada and the United States with the idea of building up an international society.

There has been a great deal of discussion locally as to the merits of the organization. Considerable support was accorded the proposition, many undergraduates favoring it enough to pay the two dollar membership fee asked by the organizer. But the majority have been in doubt as to the advisability of founding such an organization, feeling that if any such move were to be made it should originate and be carried out with the support of the recognized student body, namely, the Medical Society.

The Medical Society Executive delayed taking any action until such time as the organizer of the "union" layed his plans before the Executive and submitted his propositions for official discussion.

At a regular meeting of the Executive held in February the expected move

on the part of the organizers was made, and a delegation in the persons of two undergraduates purporting to be "directors" of the new organization, were entertained. They explained the plans, aims, constitution and scope of the undertaking and proposed that the Medical Society should endorse the scheme and lend it official sanction.

After careful consideration of the proposals by the Medical Society Executive, at subsequent meetings, the following resolution was moved and adopted: "That, while the Medical Society of the University of Toronto approves of the aims of the 'Canadian Medical Students' Association,' they cannot endorse the organization as it now stands, and therefore reject the proposals made by the organizers."

Election Results, February 23, 1928

Medical Society '28-'29

President.—H. R. Ziegler.
Vice-President.—J. R. Lind.
Sec. Treas.—K. D. McEachern.
Asst. Sec. Treas.—J. C. Scott.
Pres. Med. Athletic Assoc.—R. M. Mitchell.

Counsellors.—2T9, J. S. Hawkins; 3T0, G. H. Hutton; 3T1, T. R. Sargent; 3T2, H. D. Barner; 3T3, J. W. Sinclair.

Medical Athletic Association.

President.—R. M. Mitchell.
Vice-President.—S. A. Good.
Sec. Treas.—D. R. Gunn.
3T2 Rep.—V. O. D. King.
3T3 Rep.—E. S. Young.

2T9 Executive, 1928-'29.

President.—J. S. Hawkins.
Vice-President.—S. V. Railton.
Secretary.—Miss B. E. Burton.
Treasurer.—A. H. Walker.
S.A.C. Rep.—O. L. Stanton.
Varsity Rep.—F. M. Greig.

3T0 Executive, 1928-'29.

President.—G. H. Hutton.
Vice.President.—S. G. Shier.
Secretary.—Miss G. H. Craw.
Treasurer.—Mc. Tavish.
S.A.C. Rep.—J. L. Blaisdell.

3T1 Executive, 1928-'29.

President.—T. R. Sargent.
Vice-President.—S. A. Thompson.
Secretary.—Miss R. E. Willets.
Treasurer.—D. B. D. Layton.

3T2 Executive, 1928-'29.

President.—H. D. Barner.
Vice-President.—A. C. Baillie.
Secretary.—Miss Mahon.
Treasurer.—G. Lane.
S.A.C. Rep.—S. Lawrey.
Varsity Rep.—F. W. Tickett.

3T3 Executive, 1928-'29.

President.—J. W. Sinclair.
Vice-President.—R. J. Galloway.
Secretary.—Miss E. Stockdale.
Treasurer.—M. W. Baldwin.
S.A.C. Rep.—D. R. Nicol.
Varsity Rep.—J. Theobald.